YOR.513

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Takatoshi Tsujimura, et al.

Serial No.: 09/764,621 Group Art Unit: 2871

Filed: January 18, 2001 Examiner: Nguyen, Dung T.

For: LIQUID CRYSTAL DISPLAY PANEL AND DEVICE THEREOF

Honorable Commissioner of Patents
Alexandria, VA 22313-1450

RESPONSE TO NON-COMPLIANT APPEAL BRIEF
AND
SUBMISSION OF CORRECTED APPELLANTS' BRIEF ON APPEAL

Sir:

In response to the Notification of Non-Compliant Appeal Brief mailed May 22, 2006, Appellants submit concurrently herewith a Corrected Appellants' Brief on Appeal, in compliance with 37 C.F.R. § 41.37(c)(1)(viii), in which the Claims Appendix includes a correct copy of only the appealed claims.

Entry and consideration of the Corrected Appellants' Brief on Appeal are respectfully requested.

No fees are believed necessary. However, the Commissioner is hereby authorized to charge any deficiencies and/or credit any overpayments necessary to enter this paper to Assignee's Deposit Account No. 50-0510.

Respectfully Submitted,

Date: June 22, 2006

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CORRECTED APPELLANTS' BRIEF ON APPEAL

Sir:

Appellants respectfully appeal the final rejection of claims 1-3, 5-7, 9, 10, 12, 14-18, and 20 in the Office Action dated November 15, 2005. A Notice of Appeal was timely filed on December 30, 2005.

I. REAL PARTY IN INTEREST

The real party in interest is International Business Machines Corporation, assignee of 100% interest of the above-referenced patent application.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1-3, 5-7, and 9-20 are all the claims presently pending in the application, and are set forth fully in the attached Appendix.

Claim 11 is allowed.

Claims 13 and 19 would be allowable if rewritten in independent form.

Claims 1, 2, 4-7, 9, 10, 12, 14-18, and 20 stand rejected on prior art grounds.

(Appellants note that claim 4 was canceled by the Amendment under 37 C.F.R. § 1.111 filed on September 2, 2005. Thus, claim 4 should not be included in the final Office Action.)

Claims 1 and 2 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones et al. (U.S. Patent No. 6,417,899; hereinafter "Jones"), in view of Ichihashi (U.S. Patent No. 6,686,980; hereinafter "Ichahashi").

Claims 4-6, 11, 12, 14-18 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones, in view of Ichihashi, and further in view of Applicants Admitted Prior Art (APA) Figures 11-12.

(Appellants note that claim 11 is allowed, and therefore, should not have been included in the prior art rejection (see Office Action at page 4, paragraph 4, and page 6, paragraph 7). Claim 12 depends from allowed claim 11. Thus, claim 12 also properly should be allowed. Appellants also note that claim 4 was canceled by the Amendment under 37 C.F.R. § 1.111 filed on September 2, 2005. Thus, claim 4 should not be included in the rejection.)

Claims 7 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones, in view of Yoshihiro (JP 9-331066; hereinafter "Yoshihiro").

Claim 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones, in view of Yoshihiro, and further in view of Ichihashi.

Appellants respectfully appeal the rejections of Claims 1 and 2 under 35 U.S.C. § 103(a) over Jones and Ichihashi, Claims 4-6, 11, 12, 14-18 and 20 under 35 U.S.C. § 103(a) over Jones, Ichihashi, and Applicants Admitted Prior Art (APA) Figures 11-12, Claims 7 and 10 under 35 U.S.C. § 103(a) over Jones and Yoshihiro, and Claim 9 under 35 U.S.C. § 103(a) over Jones, Yoshihiro, and Ichihashi, which are the sole issues in this Appeal.

IV. STATUS OF AMENDMENTS

An Amendment under 37 C.F.R. § 1.111 was filed on September 2, 2005.

The final Office Action mailed November 15, 2005 entered the Amendment under 37 C.F.R. § 1.111 filed on September 2, 2005, but held Claims 1, 2, 4-7, 9, 10, 12, 14-18, and 20 unpatentable.

A Notice of Appeal was filed timely on December 30, 2005.

Therefore, the claims are pending as set forth in the Appendix.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Conventional liquid crystal display devices improve the brightness by increasing the aperture ratio by increasing the number of backlights or increasing the capacity of the backlight of the device. However, these solutions increase the size and weight of the device,

which is disadvantageous for many applications, such as a liquid crystal display for a notebook-type personal computer.

The claimed invention, on the other hand, provides a liquid crystal display having improved brightness resulting from improved light-recycling efficiency, as opposed to increasing the aperture ratio. That is, in the claimed invention, the polarization plate is not disposed between the array substrate and the light guide plate, thereby reducing absorption of the reflected light by the polarization plate and improving light-recycling efficiency and brightness of the liquid crystal display (e.g., see specification at page 7, lines 16-28).

With reference, for example, to Figures 1 and 2, Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in independent Claim 1) is directed to a liquid crystal display panel (e.g., 10), including an array substrate (e.g., 15) including a driving element (e.g., 15T) for controlling a driving voltage and a display electrode (e.g., 156) to which a voltage is applied through the driving element (e.g., 151) are formed, a first polarization layer (e.g., 14) for polarizing the light passing through the array substrate (e.g., 15), a liquid crystal layer (e.g., 16) including a liquid crystal material, a color filter substrate (e.g., 13) on which a color filter including a color-material film is formed, and a second polarization layer (e.g., 12) for polarizing the light passing through the color filter substrate (e.g., 13), wherein the array substrate (e.g., 15), the first polarization layer (e.g., 14), the liquid crystal layer (e.g., 16), the color filter substrate (e.g., 13), and the second polarization layer (e.g., 12) are successively superposed (e.g., see specification at page 11, lines 26-29, and page 12, lines 1-4).

In Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in Claim 2), a common electrode (e.g., 157) is formed on the array substrate (e.g., 15) and an electric field is generated in a direction parallel with the array substrate (e.g., 15) by applying a voltage between the display electrode (e.g., 156) and the common electrode (e.g., 157)(e.g., see specification at page 8, lines 13-23).

In Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in independent Claim 5), a liquid crystal display device (e.g., 10), includes a liquid crystal display panel (e.g., 10a) in which an array substrate (e.g., 15) and a color filter substrate (e.g., 13) are arranged to sandwich a liquid crystal layer (e.g., 16), and a backlight unit (e.g., 10b) for applying light to the liquid crystal display panel (e.g., 10a) from the outside of the array substrate (e.g., 15), wherein the light reflected from the array substrate (e.g., 15) of the liquid crystal display panel (e.g., 10a) directly returns to the backlight unit (e.g., 10b) without passing through other layers, wherein a polarization layer (e.g., 14) is disposed between the array substrate (e.g., 15) and the color filter substrate (e.g., 13) of the liquid crystal display panel (e.g., 16), and the light reflected from the array substrate (e.g., 15) returns to the backlight unit (e.g., 10b) without passing through the polarization layer (e.g., 14) so as to improve the light-recycling efficiency of the backlight unit (e.g., 10b)(e.g., see specification at page 13, lines 12-27).

In Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in Claim 6), a brightness of the liquid crystal display (e.g., 10a) is improved compared to a brightness of a liquid crystal display (e.g., 10a) in which light reflected from the array

substrate (e.g., 15) returns to the backlight unit (e.g., 10b) after passing through a polarization layer (e.g., 14)(e.g., see specification at page 14, lines 10-20).

With reference, for example, to Figures 5-8, in Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in independent Claim 7), a liquid crystal display device (e.g., 26), includes a liquid crystal display panel (e.g., 20a) in which an array substrate (e.g., 25) and a color filter substrate (e.g., 23) are arranged to sandwich a liquid crystal layer including a liquid crystal material and a reflection film (e.g., 259) is formed in an area on the array substrate (e.g., 25) corresponding to an area in the liquid crystal layer (e.g., 26) in which the liquid crystal material is oriented in a not-purposed direction when applying a voltage to the liquid crystal layer (e.g., 26), and a backlight unit (e.g., 20b) for illuminating the liquid crystal display panel (e.g., 20a) from the outside of the array substrate (e.g., 25), wherein a display electrode (e.g., 256) and a wiring (e.g., 258) conductively connected to the display electrode (e.g., 256) are formed on the array substrate (e.g., 25), and wherein the reflection film (e.g., 259) is formed on a gap between the display electrode (e.g., 256) and the wiring (e.g., 258)(e.g., see specification at page 17, lines 1-29, and page 18, lines 1-19).

In Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in Claim 9), a polarization layer (e.g., 24) is formed between the array substrate (e.g., 15) and the color filter substrate (e.g., 13) of the liquid crystal display panel (e.g., 10a)(e.g., see specification at page 21, lines 1-6).

With reference again to Figures 5-8, in Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in independent Claim 10), a liquid crystal display panel (e.g., 20a), includes an array substrate (e.g., 25)(e.g., on which a driving element (e.g., 25T)

for controlling a driving voltage and a display electrode (e.g., 256) to which a voltage is applied through the driving element (e.g., 25T) are formed, a liquid crystal layer (e.g., 26) filled with the liquid crystal material, and a color filter substrate (e.g., 23) on which a color filter including a color-material film is formed, the array substrate (e.g., 25), the liquid crystal layer (e.g., 26), and the color filter substrate (e.g., 23) being successively superposed, wherein a metal film (e.g., 259) is formed in an area of the array substrate (e.g., 25) corresponding to an area in which an electric field including a direction different from the original direction of an electric field for driving the liquid crystal material is generated, wherein the metal film (e.g., 259) is formed on a gap between the display electrode (e.g., 256) and the driving element (e.g., 25T)(e.g., see specification at page 17, lines 1-29, and page 18, lines 1-19).

With reference, for example, to Figures 9 and 10, in Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in independent Claim 11), a liquid crystal display device (e.g., 30), includes an array substrate (e.g., 35) provided with an insulating substrate (e.g., 35a), a thin film transistor (e.g., 35T) formed on the insulating substrate (e.g., 35a), a polymer layer (e.g., 39) which covers the insulating substrate (e.g., 35a) and in which polarization elements (e.g., 39a) are dispersed, and a display electrode (e.g., 40) which is formed on the polymer layer (e.g., 39) and penetrates the polymer layer (e.g., 39) and a part of which conductively connects with the thin film transistor (e.g., 35T), a color filter substrate (e.g., 33) disposed so as to face the array substrate (e.g., 35) by keeping a predetermined gap with the array substrate (e.g., 35), and a liquid crystal layer (e.g., 36) located at the gap between the array substrate (e.g., 35) and the color filter substrate (e.g.,

33), and a backlight unit (e.g., 30b) for applying light to a liquid crystal display panel (e.g., 30a) from the outside of the array substrate (e.g., 35)(e.g., see specification at page 21, lines 11-29, and page 22, lines 1-11).

In Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in Claim 12), the thin film transistor (e.g., 35T) is covered with the display electrode (e.g., 40) when horizontally viewed (e.g., see Figure 9).

With reference again to Figures 9 and 10, in Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in Claim 13), the array substrate (e.g., 35) includes an insulating substrate (e.g., 35a), a thin film transistor (e.g., 35T) formed on the insulating substrate (e.g., 35a), a polymer layer (e.g., 39) covering the insulating substrate (e.g., 35a) and including polarization elements (e.g., 39a) dispersed therein, and the display electrode (e.g., 40) formed on the polymer layer (e.g., 39) and penetrating the polymer layer (e.g., 39), a part of the display electrode (e.g., 40) conductively connecting with the thin film transistor (e.g., 35T)(e.g., see specification at page 21, lines 11-29, and page 22, lines 1-11).

Referring again to Figures 1 and 2, in Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in Claim 14), the array substrate (e.g., 15) includes at least one of a common electrode (e.g., 157), a display electrode (e.g., 156), a gate electrode (e.g., 151), a source electrode (e.g., 152), and a drain electrode (e.g., 153) interposing the array substrate (e.g., 15) and the first polarization layer (e.g., 14), and wherein at least one of the display electrode (e.g., 156), the gate electrode (e.g., 151), the source electrode (e.g., 152), and the drain electrode (e.g., 153) reflects light emitted from the backlight unit (e.g., 10b) back to the backlight unit (e.g., 10b)(e.g., see specification at page 17, lines 13-29).

In Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in Claim 15), at least one of the display electrode (e.g., 156), the gate electrode (e.g., 151), the source electrode (e.g., 152), and the drain electrode (e.g., 153) includes a reflective metal film (e.g., 259)(e.g., see specification at page 12, lines 28-29, and page 13, lines 1-2; see also page 17, lines 13-29; see Figures 2, 4, 7, and 8).

Referring again to Figures 1 and 2, in Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in Claim 16), the array substrate (e.g., 15) includes at least one of a common electrode (e.g., 157), a display electrode (e.g., 156), a gate electrode (e.g., 151), a source electrode (e.g., 152), and a drain electrode (e.g., 153).

In Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in Claim 17), at least one of the display electrode (e.g., 156), the gate electrode (e.g., 151), the source electrode (e.g., 152), and the drain electrode (e.g., 153) includes a reflective metal film (e.g., 259))(e.g., see specification at page 12, lines 28-29, and page 13, lines 1-2; see also page 17, lines 13-29; see Figures 2, 4, 7, and 8).

In Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in Claim 18), at least one of the display electrode (e.g., 256), the gate electrode (e.g., 251), the source electrode (e.g., 252), and the drain electrode (e.g., 253) reflects light emitted from the backlight unit (e.g., 10b), and wherein the reflected light directly returns to the backlight unit (e.g., 10b) without passing through other layers (e.g., see specification at page 14, lines 10-20).

Referring again to Figures 1, 2, 5, 6, and 9, Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in Claim 19), includes a backlight unit (e.g., 10b) for

illuminating the liquid crystal display panel (e.g., 10a) from the outside of the array substrate (e.g., 15), wherein the backlight unit (e.g., 10b), the array substrate (e.g., 15), the first polarization layer (e.g., 14), the liquid crystal layer (e.g., 14), the color filter substrate (e.g., 13), and the second polarization layer (e.g., 12) are successively superposed (e.g., see specification at page 11, lines 26-29, and page 12, lines 1-4), wherein the array substrate (e.g., 15) includes an insulating substrate (e.g., 35a), a thin film transistor (e.g., 35T) formed on the insulating substrate (e.g., 35a), a polymer layer (e.g., 39) covering the insulating substrate (e.g., 35a) and including polarization elements (e.g., 39a) dispersed therein, a display electrode (e.g., 40, 156) formed on the polymer layer (e.g., 39) and penetrating the polymer layer (e.g., 39), a part of the display electrode (e.g., 40, 156) conductively connecting with the thin film transistor (e.g., 35T)(e.g., see specification at page 21, lines 11-29, and page 22, lines 1-11), and a common electrode (e.g., 157) formed on the array substrate (e.g., 15), wherein the common electrode (e.g., 157) and the display electrode (e.g., 40, 156) interpose the backlight unit (e.g., 10b) and the first polarization layer (e.g., 14), wherein the display electrode (e.g., 156) includes a reflective metal film (e.g., 259) that reflects light emitted from the backlight unit (e.g., 10b) back to the backlight unit (e.g., 10b), and wherein the reflected light directly returns to the backlight unit (e.g., 10b) without passing through the polarization layer (e.g., 14) so as to improve the light-recycling efficiency of the backlight unit, thereby improving a brightness of the liquid crystal display compared to a brightness of a liquid crystal display in which light reflected from the array substrate returns to the backlight unit after passing through a polarization layer (e.g., see specification at page 18, lines 11-19).

Referring again to Figures 1, 2, 5, 6, and 9, Appellants' invention, as disclosed and claimed (e.g., as exemplarily defined in Claim 20), includes a backlight unit (e.g., 10b) for illuminating the liquid crystal display panel (e.g., 10a) from the outside of the array substrate (e.g., 15), wherein the backlight unit (e.g., 10b), the array substrate (e.g., 15), the first polarization layer (e.g., 14), the liquid crystal layer (e.g., 16), the color filter substrate (e.g., 13), and the second polarization layer (e.g., 12) are successively superposed, wherein a gate insulating film (e.g., 154) is formed on an upper side of the array substrate (e.g., 15), a gate electrode (e.g., 151) is formed in the gate insulating film (e.g., 154), an a Si film (e.g., 155) is formed on the gate insulating film (e.g., 154), a source electrode (e.g., 152) and a drain electrode (e.g., 153) are formed on the a Si film (e.g., 155) serving as a thin film semiconductor (e.g., 15T) to form a thin film transistor (e.g., 15T) serving as a liquid crystal material driving element (e.g., 15T), a display electrode (e.g., 156) is formed on the gate insulating film (e.g., 154) to extend from the drain electrode (e.g., 153), and a common electrode (e.g., 157) is formed on the gate insulating film (e.g., 154), wherein the gate electrode (e.g., 151), the source electrode (e.g., 152), the drain electrode (e.g., 153), the display electrode (e.g., 156), and the common electrode (e.g., 157) interpose the backlight unit (e.g., 10b) and the first polarization layer (e.g., 14), wherein at least one of the gate electrode (e.g., 151), the source electrode (e.g., 152), the drain electrode (e.g., 153), and the display electrode (e.g., 156) includes a reflective metal film (e.g., 259) that reflects light emitted from the backlight unit (e.g., 10b) back to the backlight unit (e.g., 10b), and wherein the reflected light directly returns to the backlight unit (e.g., 10b) without passing through the polarization layer (e.g., 14) so as to improve the light-recycling efficiency of the backlight

unit (e.g., 10b), thereby improving a brightness of the liquid crystal display (e.g., 10a) compared to a brightness of a liquid crystal display in which light reflected from the array substrate returns to the backlight unit after passing through a polarization layer.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issues presented for review by the Board of Patent Appeals and Interferences are whether Claims 1 and 2 are unpatentable under 35 U.S.C. § 103(a) over Jones and Ichihashi, whether Claims 4-6, 11, 12, 14-18 and 20 are unpatentable under 35 U.S.C. § 103(a) over Jones, Ichihashi, and Applicants Admitted Prior Art (APA) Figures 11-12, whether Claims 7 and 10 are unpatentable under 35 U.S.C. § 103(a) over Jones and Yoshihiro, and whether Claim 9 is unpatentable under 35 U.S.C. § 103(a) over Jones, Yoshihiro, and Ichihashi.

VII. ARGUMENT

A. THE EXAMINER'S POSITION

i) In the final Office Action, the Examiner alleged that Claims 1 and 2 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones in view of Ichihashi.

The Examiner acknowledged that Jones does not disclose the first polarization layer over the display electrode.

However, the Examiner alleges that Ichihashi makes up for the deficiencies of Jones by disclosing a polarizing film (16) can be formed over a display electrode (ITO film 12). Therefore, the Examiner contends that it would have been obvious to one skilled in the art at the time of the invention was made to employ a polarization layer over a display electrode as

shown by Ichihashi in order to obtain an LCD device having excellent visual angle characteristic (col. 3, line 15).

Regarding claims 2, the Examiner acknowledges that the modification to Jones discloses the claimed invention as described above except for the common electrode formed on the array substrate. However, the Examiner alleges that it would have been obvious to one skilled in the art at the time of the invention was made to employ the common electrode and the pixel electrode formed on the array substrate (i.e., in-plane switching type LCD), since it is a common practice in the art to improve viewing angle in an LCD device.

ii). The Examiner alleges that claims 4-6, 11, 12, 14-18 and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones, in view of Ichihashi, and further in view of Applicants Admitted Prior Art (APA) Figures 11-12.

First, Appellants note that claim 11 is allowed, and therefore, should not have been included in the prior art rejection (see Office Action at page 4, paragraph 4, and page 6, paragraph 7). Claim 12 depends from allowed claim 11. Thus, claim 12 also properly should be allowed.

Second, Appellants also note that claim 4 was canceled by the Amendment under 37 C.F.R. § 1.111 filed on September 2, 2005. Thus, claim 4 should not be included in this rejection.

Turning to the merits of the rejection, the Examiner acknowledges that Jones does not explicitly disclose a switching element (reflecting gate/source/drain electrode).

However, the Examiner alleges that Applicants' admitted Prior Art does disclose an array substrate comprising a switching element as claimed (see Figures 11-12). Therefore, the Examiner alleges that it would have been obvious to one skilled in the art at the time of the invention was made to form a switching (i.e., thin film transistor, TFT) for driving a display device. In addition, since the switching element formed underneath the polarization layer (as modified by Ichihashi), all light reflected would return back to backlight without passing any layers.

Regarding claim 12, the Examiner acknowledges that Jones does not disclose a polymer layer having a polarization elements as a polarization layer.

However, the Examiner alleges that Ichihashi discloses a polymerizable dichroic dyes can be used for forming an anisotropic film having a polarizing property (i.e., polarization layer). Therefore, the Examiner alleges that it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the Jones first polarization layer (53) by a polymer layer and having a polarization property as shown by Ichihashi in order to improve a display characteristic (e.g., visual angle characteristic) (col. 3, line 15). The Examiner alleges that the part of the display electrode would inherently connecting to the TFT for driving purposes.

iii) Claims 7 and 10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones in view of Yoshihiro.

The Examiner acknowledges that Jones does not disclose a reflection film.

However, the Examiner alleges that Yoshihiro disclose a reflection film (28, 30) being formed in an area (e.g., gap) between the display electrode and the wiring (of the TFT) over the array substrate (Figure 1) corresponding to an area in the liquid crystal layer in which a liquid crystal material is orient in a not-purposed direction (i.e., a direction different from an original orientation direction, outside display region) when applying a voltage to the liquid crystal layer. Therefore, the Examiner alleges that it would have been obvious to one skilled in the art at the time of the invention was made to form a reflection film in the Jones as shown by Yoshihiro in order to improve a display contrast in an LCD device (see abstract).

iv) Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones, in view of Yoshihiro, and further in view of Ichihashi.

The Examiner acknowledges that Jones does not disclose the polarization layer formed between the array substrate and the color substrate.

However, the Examiner alleges that Ichihashi discloses a polarizing film (16) can be formed over a display electrode (ITO film 12). Therefore, the Examiner alleges that it would have been obvious to one skilled in the art at the time of the invention was made to employ a polarization layer over a display electrode as shown by Ichihashi in order to obtain an LCD device having excellent visual angle characteristic (see Ichihashi at column 3, line 15).

v) Examiner's Response to Arguments

In the Response to Arguments, the Examiner states that Applicant's arguments filed 09/20/2005 have been fully considered but they are not persuasive (e.g., see Office Action at pages 7-8).

The Examiner summarizes Appellants' arguments as follows:

a. there are elements of claims 1 and 2 (and 5) which are not disclosed or suggested by Jones and Ichihashi since the alleged combination of Jones and Ichihashi would not improve overall transmittance, according to the claimed invention (amendment page 14). In addition, it would not have been obvious to modify the three polarizer system in view of the two polarizer system of Ichihashi, to arrive at the claimed invention (amendment, page 17).

b. Regarding claims 7 and 10, Yoshihiro does not teach or suggest that the planarization layer 38 serves as a polarizing layer (amendment, page 20).

The Examiner's response to Appellants' positions:

a. The Examiner agrees that Jones teaches a three polarizer system and the transmittance of polarizer might not be exceed 50%; however, the Examiner alleges that there is no definition provided how much is good or bad transmittance.

In addition, the Examiner the modification to Jones would improve a visual angle characteristic (see Ichihashi at column 3, line 15) not about contrast characteristic.

Finally, the Examiner alleges that the combination of Jones and Ichihashi would rearrange the polarizing plate, it would not modify two polarizer system into the three polarizer system as asserted by Applicant.

b. The Examiner alleges that the modification to Jones in view of Yoshihiro would employ a reflection film (28, 30) in an area between the display electrode and the wiring (i.e., gap area therebetween). The Examiner alleges that such modification would not remove all elements from the Jones's device; therefore, the Examiner alleges that the combination of Jones and Yoshihiro would result such polarizing layer combined with the reflection film as claimed invention.

B. APPELLANTS' POSITION

For at least the foregoing reasons, Appellants respectfully disagree with the Examiner's positions, and therefore, Appellants traverse each of the Examiner's rejections.

To summarize, Appellants respectfully submit that the Examiner's position is flawed as a matter of fact and law.

Thus, Claims 1 and 2 are not rendered obvious from Jones and Ichihashi, Claims 4-6, 11, 12, 14-18 and 20 are not rendered obvious from Jones, Ichihashi, and Applicants Admitted Prior Art (APA) Figures 11-12, Claims 7 and 10 are not rendered obvious from Jones and Yoshihiro, and Claim 9 is not rendered obvious from Jones, Yoshihiro, and Ichihashi.

Appellants' remarks with respect to Jones, Yoshihiro, and Ichihashi, as submitted in the Amendment under 37 C.F.R. § 1.111 filed on September 2, 2005, are incorporated herewith by reference in their entirety.

i) Claims 1 and 2:

Claims 1 and 2 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones in view of Ichihashi.

For the following reasons, Appellants respectfully disagree with the Examiner's position, and therefore, traverse this rejection. Appellants respectfully submit that the Examiner's position is flawed as a matter of fact and law.

First, Appellants submit that it would not have been obvious to combine Jones and Ichihashi to arrive at the claimed invention, absent the benefit of impermissible hindsight based analysis.

Second, Appellants submit that there are elements of claims 1 and 2 which are not disclosed or suggested by Jones and Ichihashi, either individually or in combination. Indeed, Appellants submit that the alleged combination of Jones and Ichihashi would not improve overall transmittance, according to the claimed invention.

For example, the claimed invention provides an important advantage in that the claimed arrangement improves overall transmittance of the LCD panel by polarization layer placement inside of the array substrate.

Turning to the exemplary aspects of the invention described in the specification, a first polarization layer (e.g., 14) is integrated on the array substrate (e.g., 15) (inner side of

the array substrate) and a second polarization layer (e.g., 12) (normal polarizer separately fabricated) is disposed on a color filter substrate (outer side) (all reference numerals herein being used for the Examiner's clarity only and not for limiting the claims).

A non-opening area of the array substrate (e.g., 151, 156, 158) (non-ITO metal area) reflects the light from a backlight (e.g., 17) directly back into the backlight (e.g., see Figures 2 and 4).

Turning to the language of the claims, independent claim 1 recites, *inter alia*:

> *an array substrate including a driving element for controlling a driving voltage and a display electrode to which a voltage is applied through the driving element are formed;*
> *a first polarization layer for polarizing the light passing through the array substrate;*
> *a liquid crystal layer ...;*
> *a color filter substrate ...; and*
> *a second polarization layer for polarizing the light passing through the color filter substrate,*
> *wherein the array substrate, the first polarization layer, the liquid crystal layer, the color filter substrate, and the second polarization layer are successively superposed* (emphasis added).

On the other hand, dependent claim 2 recites, *inter alia*, that "*a common electrode is formed on the array substrate and an electric field is generated in a direction parallel with the array substrate by applying a voltage between the display electrode and the common electrode*".

According to the exemplary aspects of the claimed invention, as defined for example by claim 2, the present invention provides an "in-plane switching structure" (e.g., see Figures

1 and 2) wherein an electric field is formed between the common electrode (e.g., 157) and the display electrode (e.g., 156) in a direction parallel with the array substrate.

Moreover, a display electrode (e.g., 156) can be formed under a first polarization layer (e.g., 14; see also Figures 2 and 4).

Thus, since the polarization layer is not formed between the substrate and the driving element or the substrate and the display electrode, the light reflected by the driving element and display electrode returns to the backlight unit without passing through the polarization layer (e.g., see specification at page 7, lines 18-23). Accordingly, the claimed arrangement provides an important advantage that the light-recycling efficiency and brightness of the liquid crystal display can be improved.

In comparison, with respect to Jones, the Examiner acknowledges that Jones does not disclose or suggest a first polarization layer over the display electrode. That is, the Examiner acknowledges that Jones does not disclose the claimed arrangement of features, which provides the important advantages of the claimed invention.

Particularly, Figure 2 of Jones discloses a polarization layer 53 and an orientation layer 55 disposed between the substrate 3 and the other layers of the display panel, including the pixel electrodes 7 (i.e., display electrode) and the common electrode 15.

However, the Examiner asserts that Ichihashi makes up for the deficiencies of Jones by allegedly disclosing a polarizing film 16 over a display electrode (ITO film 12), and that modifying Jones in view of Ichihashi would have been obvious to obtain an LCD device having excellent visual angle characteristics (see Ichihashi at column 3, line 15).

Appellants submit, however, that it would not have been obvious to combine Jones and Ichihashi to arrive at the claimed invention, absent the benefit of impermissible hindsight based analysis. That is, it would not have been obvious to modify the three polarizer system of Jones in view of the two polarizer system of Ichihashi, which would necessitate a complicated two-step fabrication process of each polarizing film, as well as a substantial reconstruction of the primary reference, Jones, in order to arrive at the claimed invention, as alleged by the Examiner.

That is, Appellants note that Jones teaches a three polarizer system (i.e., 31, 17, and 53; see, e.g., Figure 2 of Jones), which results in lower light transmittance emitted from the backlight. Indeed, the transmittance of the polarizer cannot exceed 50% (actually 40%) (e.g., see Jones at column 8, lines 12-16). Thus, the three layer polarizer system according to Jones will, in fact, show very poor light transmittance.

On the other hand, Ichihashi teaches two polarizing layers (i.e., 14 and 16) inside the substrate 10 with an orientation film 14 underneath each polarizing film 16, which results in a complicated two-step fabrication process. That is, Ichihashi requires the orientation film layer and the polarizing layer to form the polarization layer.

Indeed, it is noted that the claimed invention does not require such a complicated two step process to form the polarization layer.

Appellants submit that it would not have been obvious to modify the three polarizer system of Jones in view of the two polarizer system of Ichihashi, which would necessitate a complicated two-step fabrication process of each polarizing film, to arrive at the claimed invention, as alleged by the Examiner.

In the Response to Arguments, the Examiner agreed that Jones teaches a three polarizer system and the transmittance of polarizer might not be exceed 50%; however, the Examiner alleges that there is no definition provided how much is good or bad transmittance. In addition, the Examiner alleged that the modification to Jones would improve a visual angle characteristic (see Ichihashi at column 3, line 15).

Further, the Examiner alleged that the combination of Jones and Ichihashi would rearrange the polarizing plate, and not modify the two polarizer system of Ichihashi into the three polarizer system of Jones, as allegedly asserted by Applicant.

Appellants submit, however, that the Examiner is "picking and choosing" individual elements from Jones and Ichihashi to arrive at the claimed invention, without properly considering the implications of such changes on the operation of the primary reference.

Appellants submit that it is not enough merely to show that the individual elements *could* be combined to arrive at the claimed invention. Instead, to establish that the claimed invention is obvious from the references, there must be a suggestion or motivation for doing that which the inventor has done without the benefit of Appellants' own invention (i.e., without impermissible hindsight based analysis).

In this case, the Examiner merely picks the individual feature of rearranging the polarizing plate, as allegedly taught by Ichihashi, and incorporates this individual feature into Jones to try to show the specific arrangement of elements of the claimed invention.

However, a careful reading of Ichahashi shows that Ichahashi does not suggest such a picking-and-choosing of rearranging only the polarization plate. In fact, Ichahashi clearly does not disclose or suggest any embodiment which does not include the orientation film 14,

in addition to the polarizing film 16. That is, Ichahashi clearly does not disclose or suggest any embodiment in which the polarizing film 16 is independent of the orientation film 14.

Thus, Ichahashi does not (and cannot) provide any motivation for separating these features.

On the other hand, if, as Ichahashi clearly discloses, the polarizing film 16 and the orientation film 14 must both be incorporated into Jones to allegedly provide the advantages relied upon by the Examiner as the motivation for such a combination, then the Examiner's alleged combination would require a substantial reconstruction of the primary reference, Jones, in order to arrive at the claimed invention.

Thus, Appellants submit that it would not have been obvious to combine Jones and Ichihashi to arrive at the claimed invention, absent the benefit of impermissible hindsight based analysis.

Moreover, even assuming *arguendo* that such a combination would have been obvious, Appellants submit that the resulting combination of Jones and Ichihashi clearly would not arrive at all of the features of the claimed invention, or for that matter, provide the advantages thereof.

That is, Ichahashi discloses that the polarizing films 16 are formed on both sides of the liquid crystal layer 18. Thus, if, as the Examiner alleges, Ichahashi provides the motivation for rearranging the polarizing film of Jones, then each of the polarizing films 16 would be rearranged to be formed nearer to the liquid crystal 18.

Again, to do otherwise would mean that the Examiner is merely "picking-and-choosing" individual elements, not based on the teachings of the references, but instead based (impermissibly) on the teachings of the present application.

However, if each of the polarizing films 16 is rearranged to be formed nearer to the liquid crystal 18, as taught by Ichahashi, then the resulting combination of Jones and Ichahashi would not disclose or suggest the claimed arrangement of features recited in independent claim 1.

That is, the resulting combination of Jones and Ichahashi would not disclose or suggest that "*the array substrate, the first polarization layer, the liquid crystal layer, the color filter substrate, and the second polarization layer are successively superposed*", as recited in claim 1.

Instead, the resulting combination of Jones and Ichahashi would move the second polarization layer between the liquid crystal layer and the color filter substrate.

Thus, even assuming *arguendo* that such a combination would have been obvious, Appellants submit that the resulting combination of Jones and Ichihashi clearly would not arrive at all of the features of the claimed invention, or for that matter, provide the advantages thereof. Indeed, Appellants submit that the alleged combination of Jones and Ichihashi would not improve overall transmittance, according to the claimed invention.

For the foregoing reasons, Appellants submit that Jones and Ichihashi, either individually or in combination, do not disclose or suggest all of the features of claims 1 and 2.

For the foregoing reasons, the Examiner respectfully is requested to reconsider and withdraw this rejection and permit claims 1 and 2 to pass to immediate allowance.

ii) Claims 4-6, 11, 12, 14-18 and 20:

Claims 4-6, 11, 12, 14-18 and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones, in view of Ichihashi, and further in view of Applicants Admitted Prior Art (APA), Figures 11-12.

Appellants note that claim 11 is allowed, and therefore, should not have been included in the prior art rejection (see Office Action at page 4, paragraph 4, and page 6, paragraph 7). Claim 12 depends from allowed claim 11. Thus, claim 12 also properly should be allowed.

On the other hand, claim 4 was canceled by the Amendment under 37 C.F.R. § 1.111 filed on September 2, 2005. Thus, claim 4 is not pending and should not have been included in this rejection.

With respect to claims 5, 6, 14-18, and 20, Appellants traverse this rejection.

First, Appellants submit that it would not have been obvious to combine Jones, Ichihashi, and APA Figures 11 and 12 to arrive at the claimed invention, absent the benefit of impermissible hindsight based analysis, for somewhat similar reasons as those set forth above with respect to independent claim 1.

Second, Appellants submit that there are elements of claims 5, 6, 14-18, and 20 which are not disclosed or suggested by Jones, Ichihashi, and APA Figures 11 and 12, either individually or in combination.

For example, independent claim 5 recites a liquid crystal display device, including:

> *a liquid crystal display panel in which an array substrate and a color filter substrate are arranged to sandwich a liquid crystal layer; and*
>
> *a backlight unit for applying light to the liquid crystal display panel from the outside of the array substrate,*
>
> *wherein the light reflected from the array substrate of the liquid crystal display panel directly returns to the backlight unit without passing through other layers,*
>
> *wherein:*
>
> *a polarization layer is disposed between the array substrate and the color filter substrate of the liquid crystal display panel; and*
>
> *the light reflected from the array substrate returns to the backlight unit without passing through the polarization layer so as to improve the light-recycling efficiency of the backlight unit* (emphasis added).

Appellants submit that claim 5 is patentable over the alleged combination of Jones and Ichihashi for somewhat similar reasons as those set forth above with respect to claim 1.

Moreover, the APA Figures 11 and 12 is not relied upon for the claimed arrangement of features which are not disclosed or suggested by Jones and Ichihashi. Thus, APA figures 11 and 12 clearly do not make up for the deficiencies of Jones and Ichihashi, as set forth above with respect to claim 1.

Appellants submit that Jones, Ichihashi, and Applicants' Admitted Prior Art (Figures 11 and 12) do not disclose or suggest all of the features of claim 5 for somewhat similar reasons as those set forth above with respect to claim 1.

Also, according to the claimed invention, a display electrode (e.g., 40) can be formed on a polymer layer (e.g., 39) and connected to the driving element by penetrating the

polymer layer (e.g., see Figure 9). Such exemplary aspects are defined, for example, by claims 11 and 13).

For example, allowed independent claim 11 recites a liquid crystal display device, including:

> *an array substrate provided with an insulating substrate, a thin film transistor formed on the insulating substrate, a polymer layer which covers the insulating substrate and in which polarization elements are dispersed, and a display electrode which is formed on the polymer layer and penetrates the polymer layer and a part of which conductively connects with the thin film transistor;*
> *a color filter substrate disposed so as to face the array substrate by keeping a predetermined gap with the array substrate; and*
> *a liquid crystal layer located at the gap between the array substrate and the color filter substrate; and*
> *a backlight unit for applying light to a liquid crystal display panel from the outside of the array substrate* (emphasis added).

Thus, a polymer layer with dispersed polarization element (e.g., 39) therein added to the element, and the display electrode (ITO) (e.g., 40) can be disposed on the polarization layer (e.g., see Figure 9). Accordingly, this structure provides a display area (e.g., 40) that can be enlarged (e.g., as exemplarily defined by claim 12; see, e.g., Figure 9) to improve brightness.

In comparison, Ichihashi only discloses that the display electrode (ITO) is placed underneath the polarizing film (i.e., integrated on the substrate).

Therefore, even assuming *arguendo* that it would have been obvious to combine the cited references in the manner alleged by the Examiner, Appellants respectfully submit that the resulting combination of such references still would not disclose or suggest all of the

novel and unobvious features of the claimed invention, as defined for example, by independent claim 11 (and dependent claim 12).

As mentioned above, claim 11 is allowed, and therefore, should not have been included in this rejection (see Office Action at page 4, paragraph 4, and page 6, paragraph 7). Claim 12 depends from allowed claim 11. Thus, claim 12 also properly should be allowed.

Notwithstanding the above, claims 11 and 12 would not have been obvious over the cited references for at least the reasons set forth above.

Dependent Claims 6, 14-18, and 20

Claims 6, 14-18, and 20 also are patentable over the alleged combination at least by virtue of their dependencies from independent claims 1 and 5, respectively, as well as for the additional features recited therein.

For example, claim 15 recites, *inter alia*, that "*at least one of the display electrode, the gate electrode, the source electrode, and the drain electrode comprises a reflective metal film*" (emphasis added).

Claim 17 recites, *inter alia*, that "*at least one of the display electrode, the gate electrode, the source electrode, and the drain electrode comprises a reflective metal film*" (emphasis added).

Claim 20 recites, *inter alia*, that "*at least one of the gate electrode, the source electrode, the drain electrode, and the display electrode comprises a reflective metal film that reflects light emitted from the backlight unit back to the backlight unit*" (emphasis added).

In the Office Action, the Examiner admits that Jones does not disclose a reflection film (e.g., see Office Action at page 5, paragraph 5, lines 3-5). Indeed, in the other rejection (e.g., see rejection of claims 7 and 10), the Examiner relies on Yoshihiro as allegedly disclosing a reflection film (28, 30). On the other hand, the Examiner does not allege that Ichihashi discloses this feature.

Thus, the Examiner has not addressed these features of the claimed invention, as recited in claims 15, 17, and 20, in the present rejection. Appellants submit, however, that each and every element of the claims must be shown to be disclosed or suggested by the prior art references.

Appellants submit that, since the Examiner has not addressed all of the features of the claimed invention (e.g., claims 15, 17, and 20), the Examiner clearly has not established a *prima facie* case of obviousness with respect to at least these claims.

Accordingly, Appellants reserve the right to respond to a properly established *prima facie* rejection of claims 15, 17, and 20.

For the foregoing reasons, the Examiner respectfully is requested to reconsider and withdraw this rejection and permit claims 5, 6, 11, 12, 14-18 and 20 to pass to immediate allowance.

iii) Claims 7 and 10:

Claims 7 and 10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones, in view of Yoshihiro. Appellants respectfully traverse this rejection for the following reasons.

Appellants submit that neither Jones, Applicants' Admitted Prior Art (Figures 11 and 12), or Yoshihiro, either alone or in combination, discloses or suggests at least these features of independent claims 7 and 10.

Appellants submit that claims 7 and 10 are patentable over the alleged combination of Jones, APA Figures 11 and 12, and Yoshihiro, for somewhat similar reasons as those set forth above with respect to claim 1.

As mentioned above, Jones teaches a three polarizer (i.e., 31, 17, and 53) system, and results in lower light transmittance emitted from the backlight. The transmittance of polarizer cannot exceed 50% (actually 40%). Thus, the three layer polarizer system according to Jones will show very poor transmittance.

On the other hand, Yoshihiro teaches the surface treatment of metal layer 20 on the insulating layer to prevent the occurrence of hillock and the reflection from the backlight in order to improve the contrast ratio (e.g., see Yoshihiro at Abstract). Appellants note, however, Yoshihiro does not teach or suggest that the planarization layer 38 serves as a polarizing layer.

In comparison, independent claim 7 recites, *inter alia*, that "*a display electrode and a wiring conductively connected to the display electrode are formed on the array substrate*" and that "*the reflection film is formed on a gap between the display electrode and the wiring.*"

Similarly, independent claim 10 recites, *inter alia*, that "*the metal film is formed on a gap between the display electrode and the driving element.*"

In the exemplary aspects of the claimed invention, the reflection film or metal layer (e.g., 259) is additionally disposed on a gap (e.g., space), without decreasing the effective opening area (i.e., just covering the disordered area of liquid crystal alignment), to improve transmittance by reflecting the light from the backlight directly back into the backlight (e.g., as exemplarily defined by independent claims 1 and 4; see also Figures 5 and 7).

Moreover, Appellants submit that, assuming *arguendo* that the alleged combination of Jones, Applicant's Admitted Prior Art (which is not mentioned in the text of this rejection), and Yoshihiro teaches a contrast improvement for LCD, such a combination still would not teach or suggest improving the brightness by recycling the emitted light from backlight, according to the claimed invention.

Thus, Appellants respectfully submit that there are elements of claims 7 and 10 that are not disclosed or suggested by Jones, Applicants' Admitted Prior Art (Figures 11 and 12), and Yoshihiro, either alone or in combination.

For the foregoing reasons, the Examiner respectfully is requested to reconsider and withdraw this rejection and permit claims 7 and 10 to pass to immediate allowance.

iv) Claim 9:

Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones, in view of Yoshihiro, and further in view of Ichihashi.

Appellants submit that claim 9 is patentable over the cited references by virtue of its dependency from claim 7, as well as for the additional features recited therein.

Indeed, Appellants submit that claim 9 is patentable over the alleged combination of Jones, Yoshihiro, and Ichihashi for somewhat similar reasons as those set forth above with respect to claim 1.

For example, claim 9 recites, *inter alia*, that "*a polarization layer is formed between the array substrate and the color filter substrate of the liquid crystal display panel*" (emphasis added).

The Examiner acknowledges that Jones does not disclose the polarization layer formed between the array substrate and the color substrate.

However, the Examiner alleges that Ichihashi discloses a polarizing film (16) can be formed over a display electrode (ITO film 12). Therefore, the Examiner alleges that it would have been obvious to one skilled in the art at the time of the invention was made to employ a polarization layer over a display electrode as shown by Ichihashi in order to obtain an LCD device having excellent visual angle characteristic (see Ichihashi at column 3, line 15).

Appellants respectfully submit, however, that forming the polarization layer "over" the display electrode still does not disclose or suggest forming the polarization layer "*between the array substrate and the color filter substrate of the liquid crystal display panel*" as recited by claim 9.

Thus, Appellants request that the Examiner reconsider and withdraw this rejection and permit claim 9 to pass to immediate allowance.

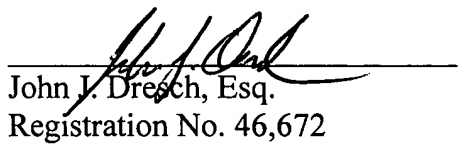
VIII. CONCLUSION

In view of the foregoing, the Board is respectfully requested to remove the rejections of Claims 1-3, 5-7, 9-12, 14-18, and 20. As mentioned above, Claim 11 is allowed and Claims 13 and 19 would be allowable if rewritten in independent form. Thus, Appellants submit that Claims 1-3, 5-7, and 9-20 of the application are patentably distinct from the prior art of record and in condition for allowance.

Please charge any deficiencies and/or credit any overpayments necessary to enter this paper to Assignee's Deposit Account No. 50-0510.

Respectfully Submitted,

Date: June 22, 2006



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CLAIMS APPENDIX

1. A liquid crystal display panel, comprising:

an array substrate including a driving element for controlling a driving voltage and a display electrode to which a voltage is applied through the driving element are formed;

a first polarization layer for polarizing the light passing through the array substrate;

a liquid crystal layer including a liquid crystal material;

a color filter substrate on which a color filter comprising a color-material film is formed; and

a second polarization layer for polarizing the light passing through the color filter substrate,

wherein the array substrate, the first polarization layer, the liquid crystal layer, the color filter substrate, and the second polarization layer are successively superposed.

2. The liquid crystal display panel according to Claim 1, wherein a common electrode is formed on the array substrate and an electric field is generated in a direction parallel with the array substrate by applying a voltage between the display electrode and the common electrode.

3. The liquid crystal display panel according to Claim 1, wherein a common electrode is formed on the color filter substrate and an electric field is generated in a direction vertical to

the array substrate by applying a voltage between the display electrode and the common electrode.

5. A liquid crystal display device, comprising:

a liquid crystal display panel in which an array substrate and a color filter substrate are arranged to sandwich a liquid crystal layer; and

a backlight unit for applying light to the liquid crystal display panel from the outside of the array substrate,

wherein the light reflected from the array substrate of the liquid crystal display panel directly returns to the backlight unit without passing through other layers,

wherein:

a polarization layer is disposed between the array substrate and the color filter substrate of the liquid crystal display panel; and

the light reflected from the array substrate returns to the backlight unit without passing through the polarization layer so as to improve the light-recycling efficiency of the backlight unit.

6. The liquid crystal display device according to Claim 5, wherein a brightness of the liquid crystal display is improved compared to a brightness of a liquid crystal display in which light reflected from the array substrate returns to the backlight unit after passing through a polarization layer.

7. A liquid crystal display device, comprising:

a liquid crystal display panel in which an array substrate and a color filter substrate are arranged to sandwich a liquid crystal layer including a liquid crystal material and a reflection film is formed in an area on the array substrate corresponding to an area in the liquid crystal layer in which the liquid crystal material is oriented in a not-purposed direction when applying a voltage to the liquid crystal layer; and

a backlight unit for illuminating the liquid crystal display panel from the outside of the array substrate,

wherein a display electrode and a wiring conductively connected to the display electrode are formed on the array substrate, and

wherein the reflection film is formed on a gap between the display electrode and the wiring.

9. The liquid crystal display device according to Claim 7, wherein a polarization layer is formed between the array substrate and the color filter substrate of the liquid crystal display panel.

10. A liquid crystal display panel, comprising:

an array substrate on which a driving element for controlling a driving voltage and a display electrode to which a voltage is applied through the driving element are formed;

a liquid crystal layer filled with the liquid crystal material; and

a color filter substrate on which a color filter comprising a color-material film is formed,

the array substrate, the liquid crystal layer, and the color filter substrate being successively superposed,

wherein a metal film is formed in an area of the array substrate corresponding to an area in which an electric field including a direction different from the original direction of an electric field for driving the liquid crystal material is generated,

wherein the metal film is formed on a gap between the display electrode and the driving element.

12. The liquid crystal display device according to Claim 11, wherein the thin film transistor is covered with the display electrode when horizontally viewed.

14. The liquid crystal display device according to Claim 1,

wherein the array substrate comprises at least one of a common electrode, a display electrode, a gate electrode, a source electrode, and a drain electrode interposing the array substrate and the first polarization layer, and

wherein at least one of the display electrode, the gate electrode, the source electrode, and the drain electrode reflects light emitted from the backlight unit back to the backlight unit.

15. The liquid crystal display device according to Claim 14,

wherein at least one of the display electrode, the gate electrode, the source electrode, and the drain electrode comprises a reflective metal film.

16. The liquid crystal display device according to Claim 5, wherein the array substrate comprises at least one of a common electrode, a display electrode, a gate electrode, a source electrode, and a drain electrode.

17. The liquid crystal display device according to Claim 16, wherein at least one of the display electrode, the gate electrode, the source electrode, and the drain electrode comprises a reflective metal film.

18. The liquid crystal display device according to Claim 5, wherein at least one of the display electrode, the gate electrode, the source electrode, and the drain electrode reflects light emitted from the backlight unit, and

wherein the reflected light directly returns to the backlight unit without passing through other layers.

20. (Previously presented) The liquid crystal display panel according to Claim 1, further comprising:

a backlight unit for illuminating the liquid crystal display panel from the outside of the array substrate,

wherein the backlight unit, the array substrate, the first polarization layer, the liquid crystal layer, the color filter substrate, and the second polarization layer are successively superposed,

wherein:

a gate insulating film is formed on an upper side of the array substrate;

a gate electrode is formed in the gate insulating film;

an a Si film is formed on the gate insulating film;

a source electrode and a drain electrode are formed on the a Si film serving as a thin film semiconductor to form a thin film transistor serving as a liquid crystal material driving element;

a display electrode is formed on the gate insulating film to extend from the drain electrode; and

a common electrode is formed on the gate insulating film,

wherein the gate electrode, the source electrode, the drain electrode, the display electrode, and the common electrode interpose the backlight unit and the first polarization layer,

wherein at least one of the gate electrode, the source electrode, the drain electrode, and the display electrode comprises a reflective metal film that reflects light emitted from the backlight unit back to the backlight unit, and

wherein the reflected light directly returns to the backlight unit without passing through the polarization layer so as to improve the light-recycling efficiency of the backlight unit, thereby improving a brightness of the liquid crystal display compared

to a brightness of a liquid crystal display in which light reflected from the array substrate returns to the backlight unit after passing through a polarization layer.

EVIDENCE APPENDIX

Not applicable.

RELATED PROCEEDINGS APPENDIX

Not applicable.